

6.1. Bioscience Research Sub-theme

Eastern part of Ethiopia is rich in plant and animal diversity. Biodiversity provides ecosystem services, and forms an integral part of the rural economy, providing subsistence, goods and medicines. However, research on biodiversity, particularly from the point of view of their ecology and conservation status; use to the local people and potentials for pharmaceuticals and industrial purposes; responses to abiotic and biotic stresses are lacking. As a result, biodiversity is being lost together with indigenous knowledge of people around them. The biosciences research sub-theme, therefore, set out a research priority to study 'Plant and Animal Biodiversity' from the following specific project components stand point.

- Ecological and ethno-botanical investigations of vegetations of different ecosystems of eastern Ethiopia;
- Phytochemical and bioactivity studies of ethno-medicinal plants;
- Antioxidant properties of ethno-medicinal plants;
- Evaluation of non-food plants for bio-fuel potential;
- Impact of climate change on plant performance;
- Marker assisted genetic diversity study of plants of economic importance;
- Ethnozoology and wildlife ecology;
- Molecular characterization and species diversity of animals;
- Eco-epidemiology and transmission of parasites.

6.2. Chemical Science Research Sub-theme

Synthetic materials have many applications in medicine, pharmaceuticals, food, construction, manufacturing industries, etc. Ethiopia is rich in resources (biological and non-biological) that can be used as input in material science and synthesis. The rich biological resources we have are opportunities to use natural products in an array of applications provided that efficient scientific methods of extraction, screening and isolation are put in place. With this great potential, a great deal of researches are required to advance knowledge in areas of material science using local resources that would inevitably be used to generate technologies for various applications.

The Chemical research sub-theme, therefore, set out a research priority to study 'Material Synthesis and Method Optimization for Natural Product Extraction and Trace Chemical Analysis' from the following specific project components stand point.

- Material synthesis (transition metal-chalcogens, conducting polymers, metal oxides/conducting polymers and metal-organic frameworks);
- Developing reaction methodology in synthetic organic chemistry;
- Exploration of new phyto-isolates;
- Method development for the extraction and isolation of trace chemical compounds;
- Utilization of locally available low cost materials for environmental remediation.

6.3. Mathematical Research Sub-Theme

Mathematics provides the framework for understanding almost any complicated phenomenon. Advanced mathematical techniques are used to model and test products on computers, optimize production techniques and have interplay with various systems. Advancing mathematical research helps to build strong scientific community capable of technology generations and new innovations. Despite its immense role, research in mathematics is not being conducted to its best level.

Thus, recognizing the importance of mathematical researches to the building of strong scientific bases for technology generations and innovations, the Mathematical Research Sub-theme set out a research priority to study 'Modern Techniques in Optimization, Mathematical Models in Stochastic Differential Equations and Queuing Theory' from the following specific project components' stand point.

- Modern Optimization Techniques;
- Stochastic Differential Equation and Queuing Models;
- Algorithms in Fixed Point Theory.

6.4. Biophysics and Computational Physics Sub-Theme

Computational physics develops algorithms that are of immense use in industries and medical issues. Research output on material computation can serve as an input to any nanoscale related research to improve the efficiency of the material for energy generation, waste treatment, sensors and so on. In spite of immense industrial applications, research works are scanty so far. Cognizant of enormous use of computational research in industries and medicine, the Computational Physics Sub-theme prioritized Material Computation, Algorithm Development, Evaluation and Applications from the following specific project components' stand point.

- Material Computation;
- Modeling Stochastic Events (Case of Pandemics and Data Mining);
- Simulation and Application Virtual as Laboratory;
- Industrial (agricultural, factory) Applications (process and quality control);
- Algorithm Development and Evaluation of its Accuracy and Computational Speed.